Subject Index

Ackermann function, 29
Admissible family, 232
Affine curvature, 121
Affine distance, 121
Affine-invariant point, 115
Affine isoperimetric inequality, 106
  general, 108, 109
Affine normals, 121, 177
Affine surface area, 113
Aleksandrov–Fenchel inequality, 130, 132, 196, 197, 203
Algebraic variety, rational, 203
Algorithm(s)
  shortest path, 376
  variable metric, 366
Allowable sequence, 34
  of permutations, 14
Amphicheiral tiling, 231
Apeirohedra, 224
Approximation, quadratic, 370
Area function, 116, 122
Auerbach–Banach–Mazur–Ulam theorem, 262

Baire category theorem, 163
Balanced family, 232
Basepointed geometric lattice, 73
Betti numbers, 171
Blaschke–Santaló inequality, 106, 113
Block, fundamental, 283
Boundary
  artificial, 306
  real, 306

Caratheodory's theorem, 89
Chromatic number, 4
Clique, 374
Clique cover number, 374
Cluster analysis, 353
Cohen–Macaulay ring, 200
Coline, 69
Combinatorial spheres, 196
Combinatorially isomorphic, strongly, 136
Compound bodies, 224
Computational complexity, 364
Cone
  dual, 218
  maximal, 271
  of normal vectors, 135
Configuration(s)
  generalized, 37, 353
  locally equivalent, 14
  slope-critical, 37
Contraction, 75
Convex mirror, 165
Coplane, 69
Copoint, 75
Covering, 262
  central, 271
  isometric, 263
  nondissective, 274
  translative, 263
Covering density, 263
Coxeter diagram
  complete, 233
  symmetry, 233
Coxeter tiling, 242
Crapo's invariant, 78
Critical exponents, 165
Critical points, 176
Critical sequence, 37
Curvature, constant relative, 110
Curvature function, 108, 114
Cut-set, local, 185

d-cube, 205
Deformation-retract, 225
Degree of mapping, 170
Dehn-functional, 231
Dehn–Sommerville equations, 213
Delaunay triangulation, 323
Deletion, 75
Density
  integral-geometric, 92
  for lines, 129
  for planes, 129
Design, 279
Diameter, geodesic, 276
Dirac conjecture, 59
Directions, distinct, 8, 57
Discriminant surface, 166
Dissection problem, 299
Distances, distinct, 1, 9, 52
Distinct slopes, 34
Dual graph, 192

Eberhard-type problem, 299
Eberhard-type theorem, 300
Edge of type *i*, 206
Edge-paths, 61
Ellipsoid algorithm, 364
Equivelar, 224
Euclidean Ramsey theory, 21
Euclidean topological arrangement, 70
Euler's equation, 193
Euler's formula, 212

Euler's inequality, 193
Exponential cross, 37
Extreme normal vector, 135
Extreme supporting hyperplane, 136, 138

f-vector, 212
Fabric, 279
Face, 192
Face flag, 352
Facet, 97, 224
Fan, 218
Fault line, 315
Fibration, 199
Flats, 69
  tangent, 93
Focal surface, 173
Forming blocks, 244
Four-polytope, 98
Four-simplex, 104
Franklin invariant, 129

Gabriel graph, 323
Gauss map, 116
General intersection, 70
Generalized focal set, 175
Generalized simplex, 148
Geodesic segment, 165
Geometric lattice, 35
Geometric sorting, 350
Geominimal surface area, 115
Gorenstein complex, 220
Gorenstein ring, 221
Gradient method, reduced, 370
Graph
  labeled, 233
  perfect, 375
Group
  Coxeter, 256
  icosahedral, 225
  octahedral, 225
  symmetric, 228
  tetrahedral, 225

Hadwiger–Hill process, 254
Hadwiger–Hill simplex, 237
Hadwiger–Hill tiling, 238
Half-region, 307
Hard Lefschetz theorem, 219
Hausdorff measure, 163
Hausdorff metric, 103, 163, 196
Heilbronn problem, 6, 56
Helly-type theorem, 166
Hessian matrix, 92, 366
Hilbert function, 215
Hilbert series, 215
Hodge Index Theorem, 203
Hölder conditions, 164
Homogeneous system of parameters, 215
Hyperplane(s)
  arrangement of, 69
  oriented, 347
  topological, 70

i-cell, 225
Index
  binary, 287
  of critical point, 170
Inequality of Winternitz, 106
Isometric covering, 271
Isonemal, 283
Isotopy conjecture, 12
Isthmus, 75

Kahler manifold, 203
Karmarkar algorithm, 377
Koszul complex, 200
Krasnosel'skii's theorem, 142
Krull dimension, 215
Kubota formula, 133
Kuhn–Tucker conditions, 367

Lagrangian function, augmented, 367
Lagrangian method, 367
Lambda matrix, 347
Lattice, geometric, 72
Lattice packing, 163
Lattice polytope, 196
Laurent polynomials, 197
Least squares distances, 355
Levi enlargement lemma, 36
Line problem, 34
Lines
  arrangement of, 65
  distinct, 66
  ordinary, 2
Link, 216
Local convexity, point of, 142, 179
Local nonconvexity, point of, 142, 179
Local sequences, 13
Lower-bound conjecture, 217
  generalized, 217
Löwner ellipsoid, 165
Lusternik–Schnirelmann category, 177

m-directions, 93
M-vector, 217
Manifold(s)
  equivelar, 225
  semi-Platonic, 225
Matroid, 35
  free, 75
  oriented, 36, 75, 353

paving, 81
simple, 72
uniform, 75
Max-cut problem, 377
McMullen's conjecture, 218
Metric dependence, 88
Midpoint polyhedron, 88
Milnor's number, 196
Minimal ellipsoid, 163
Minimum spanning tree, 323
rectilinear, 329
Minkowski inequality, 106, 117, 130, 197
Minkowski problem, 109, 115
Mixed area function, 133
Mixed discriminants, 132
Mobius function, 73
Modular copoint, 79
Modular line, 46
Moment curve, 214
Monetary rewards, Erdös, 2, 3, 7, 9
Monge–Ampère equation, 116
Monkey saddle, 176
Monocheiral simplex, 231
Monohedral tiling, 231
Morse's lemma, 170
Morse's relations, 170
Moser graph, 22

Near-pencil, 34, 71
Nearest neighbor problem, 327
Newton polytope, 197
Noether normalization lemma, 215
Normal bundle, 170
NP-complete, 374

Objective coefficient, 378
One-skeleton, 225
Optimal design, 166
Optimization algorithm of Shor and Khachyan, 166
Optimization method, nonlinear, 365
Order equivalent, 13
Order type, 13, 349
Ordering, canonical, 352
Ordinary line, 34

Packing, isometric, 265
Packing density, 263
Packing points, 61
Partition regularity, 20
Pattern recognition, 323, 352
Period, exact, 283
Permanents, 132
Placing vertices, 210
Poincaré duality, 221
Polar body, 107
Polya's enumeration theorem, 287
Polygon, ETS, 299
Polyhedra, infinite, 224
Polyhedral immersion, 192
Polyhedral two-manifold, 194
Polynomial time complexity, 355
Polytope
cyclic, 214
rational, 218
regular, 98
simplicial, 97, 104, 212
toroidal, 192
Primitive recursive, 29
Projection, normal, 268
Projective topological arrangement, 70
Projective transformation, 377
Prototile, 230
monocheiral, 249
Pseudoline(s), 353
arrangement of, 31
Puiseux series, 201
Pulling vertices, 205

Quadratic programming, convex, 362
Quarter-region, 307

Ramsey set, 7, 22
Ramsey theory, 20
Region, feasible, 367
Regression analysis, 355
Regular face, 160
Retract-graph, 225
Rosenbrock's function, 373

Santaló point, 107, 114
Sard's lemma, 173
Sard's theorem, 175
Satin, 295
Schoenflies theorem, 36
Search, variable metric, 366
Self-minimal, 118
Semiequivalent, 12
Shannon capacity, 375
Shellable, 214
Signature, 353
Similitude invariant, 128
Simplex
Choquet, 147
generalized, 147
Simplicial sphere, 212
Simplicial tiling, 243
Singular face, 162
Skew polyhedra, 224
Slab, width, 273
Slope problem, 34
Sphere
combinatorial, 220
Ramsey, 23

Sphere of influence graph, 323
Spherical shell, minimal, 173
Stable set, 375
Stable set number, 374
Starlike, finitely, 145
Starshaped, locally, 179
Steepest descent, method, 366
Steiner minimal tree, 328
  rectilinear, 329
Steiner point, 328
Steiner tree, full, 330
Steinitz's theorem, 212
Stereochemistry, 353
Stretchable, 33
Substrip, 319
Support of an optimal design, 166
Surface area, relative, 115
Sylvester Problem, 34
Symmetric difference metric, 163
Symmetry of tiling, 232

Tangent directions, 164
Tangent property, 315
Tangential body, 136
Tarski's plank problem, 268
Tetrahedron
  regular spherical, 104
  spherical, 97
Tietze's Theorem, 179
Tiling(s)
  monohedral, 230
  partial, 304
  regular, 224
  simplicial, 242
Translative covering, 272
Trees
  minimum spanning, 61
  Steiner minimal, 61
Triangulation, full flag, 209
Tricolumnar array, 37
Tunnel property, 315
Tutte–Grothendieck law, 79
Twill, 283
Twillin, 295
Two-manifold, polyhedral, 224

Upper bound conjecture, 214
Urysohn inequality, 106

Van der Waerden conjecture, 132
van der Waerden's theorem, 29
Variety
  abstract, 218
  projective, 219
  toric, 218
Vertex induced subgraph, 375
Vertices, stable, 374
Voronoi diagram, 324
Voronoi regions, 255

Warp, 279
Weft, 279
Weighted clique problem, 375
Weingarten map, 172
Whitney numbers, 73

Zonohedron, 65
Zonotope, 36